SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
School of Mathematics
B. Tech.III sem. (Branch Electrical) Minor /
Major Examination (Odd/Even/Summer) 2019-20

Entry No: 1 8 B E E 0 2 1
Date:

Total Number of Pages: [1]
Total Number of Questions: [6]

Course Title: Integeral transform and complex analysis
Course Code: MTL2023

Time Allowed: 1.5 Hours

Max Marks: [30]

Instructions / NOTE

i. Attempt All Questions.

Q1.	Express $f(x)=\|x\|, -\pi \le x \le \pi$, as fourier series. Hence show that $-\frac{1}{1^2}+\frac{1}{3^2}+\ldots\ldots=\frac{\pi^2}{8}$	5	CO1
Q2.	State and prove convolution theorem.	5	CO1
Q3.	An alternating current after passing through a rectifier has the form $i=\left\{\begin{matrix} I_0 Sinx, for\ 0 \le x \le \pi \\ 0, \pi \le x \le 2\pi \end{matrix}\right\}$ Where I_0 is the maximum current and the period is 2π. Express i as a fourier series.	5	CO1
Q4.	Find a series of cosines of multiples of x which will represent $x\sin x$ in the interval $(0,\pi)$ and show that $\frac{1}{1.3}-\frac{1}{3.5}+\ldots\ldots=\frac{\pi-2}{4}$	5	CO1
Q5.	a.Find the inverse lapace transformation of $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$ by using convolution theorem. b. Prove that $f \otimes g = g \otimes f$ on $[o,\infty)$	5	CO2
Q6.	State and prove first shift property and use it to evaluate the lapace transformation of $t^3 e^{3t}\cos kt$	5	CO2

Course Outcomes: After the successful completion of the course, students shall be able to

CO1. Find the fourier series of the periodic functions and its applications
CO2. Find the lapace transformation of the different functions like trigonometry function, functions, exponential functions etc. and its applications.

SHRI MA DEVI UNIVERSITY, KATRA
Mathematics
B. Tech.III se lectrical) Re- Minor Exam/
Major Examin Even/Summer) 2019-20

Entry No: 1 8 B E E 0 2 [illegible]
Date:

Total Number of Pages: [1]
Total Number of Questions: [6]

Course Title: Integeral transform and complex analysis
Course Code: MTL2023

Time Allowed: 3 Hours
Max Marks: [50]

Instructions / NOTE
i. Attempt Any five Questions.

Q1.	(a) Define an analytic function. What is necessary condition for a function $f(x) = u(x,y) + i\,v(x,y)$ to be analytic? Hence show that the function $f(z) = 2x^2 + y + i(y^2 - x)$ is not analytic.	5	CO4
	(b) Expand $f(z) = \frac{1}{1-z}$ in a Taylor series with centre $z_0 = 2i$.	5	
Q2.	a) Define isolated singularity of a complex function with a suitable example. Find the kind of singularity of the function $\sin\left(\frac{1}{1-z}\right)$ at $z = 1$.	5	CO4
	b) Find the residue of the function $f(z) = \frac{z}{(z-3)^3(z-2)(z-1)}$ at $z = 1$.	5	
Q3.	a) An alternating current after passing through a rectifier has the form $i = \begin{cases} I_0 \sin x, \text{ for } 0 \le x \le \pi \\ 0, \pi \le x \le 2\pi \end{cases}$ Where I_0 is the maximum current and the period is 2π. Express i as a fourier series.	5	CO2
	b) State and prove Multipication by t- property and use it to evaluate $t^n \sin kt$	5	
Q4.	a) Find a series of cosines of multiples of x which will represent $x \sin x$ in the interval $(0, \pi)$ and show that $\frac{1}{1.3} - \frac{1}{3.5} + \dots = \frac{\pi - 2}{4}$	5	CO1
	b) Express fourier series for $f(x) = e^{-x}$ in the interval $0 \le x \le 2\pi$.	5	
Q5.	a. State and prove convolution theorem.	5	CO2
	b. Prove that $f \otimes g = g \otimes f$ on $[0, \infty)$	5	

Q6.	Solve the following differential equations a. $(D^2+n^2)y = a\sin(nt+b), with \quad y(0)=y'(0)=0$ b. $y''+9y=\cos 2t, with \quad y(0)=1, y(\frac{\pi}{2})=-1$	5 5	CO2

Course Outcomes: After the successful completion of the course, students shall be able to

CO1. Find the fourier series of the periodic functions and its applications
CO2. Find the lapace transformation of the different functions like trigonometry function, functions, exponential functions etc. and its applications.
CO3. Understand, construct and write proofs.
CO4. To develop the fundamentals complex analysis and use it to solve numerical analysis.